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竹亚科酸竹属的研究

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A STUDY ON THE GENUS *ACIDOSASA* OF BAMBUSOIDEAE

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Summary The genus *Acidosasa* was published by the present authors in 1979. It only had one species at that time, *Acidosasa chinensis* C. D. Chu et C. S. Chao. Since then species number of the genus steadily increases. The authors have rather comprehensively studied this genus and its related genera for Fl. Reip. Pop. Sin. The present paper deals mainly with morphological characteristics of the genus *Acidosasa* and the differences from its related genera i. e. *Arundinaria, Sasa* and *Indosasa*. The genus *Acidosasa* is closely related to the genus *Arundinaria* in the type and origin of inflorescences and the vegetative appearance. But it differs from *Arundinaria* in the structure of florets. In *Acidosasa*, each floret is provided with six stamens, while in *Arundinaria* each floret is of only three stamens. The genus *Acidosasa* is similar to the genera *Indosasa* and Sasa in the numbers of stamens, but it is distinguished from *Indosasa* by its semelauctant (determinate) inflorescence, not iterautant (indeterminate) one, from Sasa by its taller stature and branch complement with three branches.

We have carefully examined all the type specimens of *Acidosasa* and its related genera. A conclusion reached is that there are six species in the genus *Acidosasa*, most of which are native to S. China, with only one species in Viet Nam. Five specific binomials are reduced and one species is transferred into this genus. Two keys to species, respectively based on the flowering and vegetative characters, are given as follow:

Key to species of the genus *Acidosasa* (1)(based on the flowering state)

1. Lemmas glabrous.
   2. Spikelets stout, 3—6mm broad, pedicels 1.5—4cm long; lemmas large, 1.5—2.2cm long, with 15—19 nerves, subcoriaceous, not glaucous, shiny.
      3. Lemmas up to 2.2cm long with conspicuously transverse veinlets, tessellate; palea and rhachilla entirely. glabrous, lodicules elliptic–lanceolate, glabrous ··· 1. **A. chinensis**
      3. Lemmas 1.5—1.8cm. long, slightly tessellate; palea puberulous at apex of carina, rhachilla puberuous at apex, lodicules obovate, ciliate at apex ·········· 2. **A. brilletii**
   2. Spikelets rather slende, 2—4mm broad, pedicels 0.5—1cm long; lemmas small, about 1.3 cm long, with 7—13 nerves, more or less glaucous ················ 3. **A. chienouensis**

1. Lemmas pubescent.
 4. Glumas and lemmas densely pubescent ································· 4. **A. hirtiflora**
 4. Glumas subglabrous, lemmas sparsely pubescent.
  5. Spikelets large, 3—7 cm long, lemmas 1.6—1.7 cm long, pedicels 2—13 mm long ································· 5. **A. longiligula**
  5. Spikelets small, 2—3.7 cm long, lemmas about 1.3 cm long, pedicels 1—3 cm long ································· 6. **A. venusta**

Key to species of the genus *Acidosasa* (2)(based on the vegetative state)

1. Ligules of leaf-sheaths strongly elevated, usually 2—8 mm long.
 2. Young culms with bristly sheath scars; culm-sheaths without auricles and oral setae, not spotted, sheath-blades erect ································· 4. **A. hirtiflora**
 2. Young culms with glabrous sheath scars; culm-sheaths with small auricles and oral setae, sparsely spotted, sheath-blades reflexed ································· 5. **A. longiligula**
1. Ligules of leaf-sheaths inconspicuous, less than 2 mm long.
 3. Young culms more or less bristly, or sheath-scars bristly:
  4. Culm-sheaths without auricles and oral setae, not farinose, without hairs at base.
   5. Young culms densely bristly; culm-sheaths attenuate at apex and as wide as sheath-blades, with conspicuously transverse veinlets; leaf-blades large, usually 2.5—3.5 (—6.5) cm broad, conspicuously tessellate ································· 1. **A. chinensis**
   5. Young culms sparsely bristly; culm-sheaths truncate at apex and broader than sheath-blades, without transverse veinlets or inconspicuous; leaf-blades small, 1.5—2.5 cm broad, without visible transverse veinlets ································· 6. **A. venusta**
  4. Culm-sheaths with auricles and oral setae, slightly farinose, densely bristle at base; leaf-blades rather narrow, 0.8—1.8 cm broad ································· 3. **A. chienouensis**
 3. Young culms entirely glabrous; leaf-blades rather narrow, 1.2—1.8 cm broad ································· 2. **A. brilletill**

Key words *Acidosasa*; Taxonomy.

摘要 在对竹亚科散生竹全面研究基础上,本文对酸竹属进行了系统的整理和研究,讨论了本属与相近属之间亲缘和区别。本文确认有 6 种,其中有 1 新组合和 5 个新异名。

关键词 酸竹属;分类学。

酸竹属 *Acidosasa* 由本文作者于 1979 年建立,当时仅有 1 种。近十年来,我国学者陆续发表了酸竹属若干新种。作者在编写《中国植物志》、《中国树木志》时,查阅了酸竹属及其近缘属的全部模式标本,经过系统研究和整理,确认本属已知有 6 种,除 1 种产越南外,其余产于我国南方各省区。

属的特征及与近缘属的属区别

Acidosasa C. D. Chu et C. S. Chao in Journ. Nanj. Tech. Coll. For. Prod. **1979** (1—2):142. 1979 et Bamb. Res. **1981** (1):31. 1981; Clayton et Renv., Gen. Gram. 47. 1986.

酸竹属为乔木状竹类；地下茎单轴型。竹秆散生，直立，节间圆筒形，无沟槽或分枝一侧中下部微有沟槽，秆内壁常海绵状增厚，不为笛膜状；秆芽单生，中部各节分枝多为3，上部有时5，具秆环和箨环，秆环通常微隆起。秆箨脱落性，常被小刺毛。叶片大小有变化，网脉通常明显。出笋期春季至初夏。

花序顶生，通常由3—5枚小穗组成，排成总状花序或简单的圆锥花序，小穗通常粗壮，具明显的小穗柄；颖片2—4枚，小花多数；外稃大，多脉，网脉明显，先端渐尖或具芒；内稃较短，2脊状，先端钝，多脉；鳞被3枚，膜质，边缘常透明；雄蕊6枚，花药黄色，花丝丝状，分离；花柱1，柱头3裂，羽毛状。花期夏季或秋季。

属名模式：酸竹 *Acidosasa chinensis* C. D. Chu et C. S. Chao.

本属在亲缘关系上接近青篱竹属 *Arundinaria* Michaux，两者在地下茎类型、竹秆形态和花序类型方面具有很多相似之处；但青篱竹属小花具3枚雄蕊，内稃先端常2裂。本属的小花构造又与大节竹属 *Indosasa* McCl. 和赤竹属 *Sasa* Makino et Shibata 相近，小花均具6枚雄蕊；但大节竹属的小穗实为假小穗(pseudospikelet)，其基部颖片腋内具芽，可分枝形成次级假小穗，使整个花序为多次分枝形成的假小穗丛，假小穗大小不等，均无小穗柄；而酸竹属为总状花序或圆锥花序，小穗大小几相等，通常具明显的小穗柄。因此两者在花序的发生起源上相差甚远。赤竹属则为灌木状竹类，地下茎复轴型，竹秆每节仅具1枚分枝且与秆近等粗，两者容易区别。

本属已知6种，产于中国的福建、湖南南部、广东、广西西北部、云南东南部以及越南北部。适应中亚热带、南亚热带的气候条件。

分种检索表(一)(根据生殖器官)

1. 小穗外稃背部光滑无毛。
　2. 小穗粗大，宽3—6mm；小穗柄长1.5—4cm；外稃大，长1.5—2.2cm，无白粉，具15—19脉.
　　3. 外稃长达2.2cm，网脉甚明显；内稃完全无毛；鳞被椭圆状披针形，无毛；小穗轴无毛 ……………… 1. **酸竹 A. chinensis**
　　3. 外稃长1.5—1.8cm，网脉略明显；内稃脊上先端有毛；鳞被倒卵形，先端有纤毛；小穗轴先端有毛 ……………… 2. **越南酸竹 A. brilletii**
　2. 小穗较细，宽2—4mm；小穗柄长0.5—1cm；外稃长约1.3cm，微有白粉，具7—13脉 ……………… 3. **粉酸竹 A. chienouensis**
1. 小穗外稃背部密被毛或多少有毛。
　4. 小穗颖片和外稃密被毛，小横脉不明显。 ……………… 4. **毛花酸竹 A. hirtiflora**
　4. 小穗颖片近无毛，外稃疏生毛，小横脉较明显。
　　5. 小穗粗长，长3—7 cm；外稃长1.6—1.7cm；小穗柄长2—13 mm ……… 5. **福建酸竹 A. longiligula**
　　5. 小穗细短，长2—3.7cm；外稃长约1.3cm；小穗柄长1—3cm ……………… 6. **坭竹 A. venusta**

分种检索表(二)(根据营养器官)

1. 叶舌强烈隆起，通常高2—8mm。

2. 新秆箨环有刺毛;秆箨无箨耳和縫毛,无斑点,箨片直立 ………………… 4. **毛花酸竹 A. hirtiflora**

2. 新秆箨环无毛;秆箨具小箨耳和縫毛,疏生小斑点,箨片反曲 ………… 5. **福建酸竹 A. longiligula**

1. 叶舌不明显,高 2mm 以下。

3. 新秆多少被刺毛或箨环有刺毛。

4. 秆箨无箨耳和縫毛,无白粉,基部无毛。

5. 新秆密被短刺毛;秆箨先端渐窄且与箨片等宽,小网脉特别明显;叶片宽大,通常宽2.5—3.5(6.5)cm,网脉明显 ……………………………………………………… 1. **酸竹 A. chinensis**

5. 新秆疏生刺毛;秆箨先端平截,宽于箨片基部,小横脉不明显;叶片较小,宽 1.5—2.5cm …………………………………………………………………………… 6. 坭竹 A. venusta

4. 秆箨具箨耳和縫毛,微被白粉,基部密生刺毛;叶片狭小,宽 0.8—1.8cm …………………………………………………………………………… 3. **粉酸竹 A. chienouensis**

3. 新秆光滑无毛;叶片较狭,宽 1.2—1.8cm ……………………………………… 2. **越南酸竹 A. brilletii**

1. **酸竹** 图 1

Acidosasa chinensis C. S. Chu et C. S. Chao in Journ. Nanj. Tech. Coll. For. Prod. **1979** (1—2):142. f. l. 1979 et in Bamb. Res. **1981** (1):31. f.l. 1981.

广东: 阳春,河尾山,海拔 700m,梁葵 69503 (后选模式 leptotype, NFU);同地,梁宝汉 89477 (NFU, SCAC);同地,湛江植物调查队 4211 (SCBI);同地,朱政德、王正 7924 (NFU)。

本种发表时,作者考虑鉴定方便起见,分别指定花模式标本(梁葵 69503)和营养体模式标本(朱政德、王 正 7924),这不符合国际植物命名法规,主模式只能是一份标本。为此作者现指定梁葵 69503 为后选模式。

2. **越南酸竹** 图 2

Acidosasa brilletii (A. Camus) C. S. Chao et Renv. in Kew Bull. **44** (2):351. 1989. ——*Arundinaria brilletii* A. Camus in Bull. Soc. Bot. France **74**:620. 1927.

越南: Tonkin, Yen-lap, Brillet 90 (holotype p).

作者在英国皇家植物园从事竹子分类研究期间,曾从法国自然历史博物馆借阅 Brillet 90 标本。本种原发表为青篱竹属的一个种,经研究确认其为酸竹属一成员。模式为花枝标本,形态酷似酸竹,唯小花较小,外稃长 1.5—1.8cm,小穗轴和内稃先端脊上微有毛,叶片狭小,长 12—19cm,宽 1.2—1.8cm,侧脉 4—5 对,易于区别。

3. **粉酸竹** 图 3

Acidosasa chienouensis (Wen et Chang) C. S. Chao et Wen in Journ. Bamb. Res. **7** (1):31. 1988. ——*Indosasa chienouensis* Wen et Chang in Journ. Bamb. Res. **2**(1): 67. f. 19. 1983 —— *Acidosasa glauca* B. M. Yang in Acta Phytotax. Sin. **22**(1): 85. f. l. 1984, syn. nov.

福建: 建瓯,万木林,华锡奇、张培新 81607 (holotype ZJFI). **湖南**: 江华,海拔 600m,杨保民 06431 (holotype of *Acidosasa glauca* HNTC, isotype NFU).

温太辉先生最早发表本种置于大节竹属,模式为花枝标本,其花序为次发生,具 2—5 小穗,小穗柄长 5—10mm,应为酸竹属成员。杨保民先生根据湖南所采花枝标本发表了 *Acidosasa glauca*.作者仔细比较了 *Indosasa chienouensis* Wen et Chang 和 *Acidosasa glauca*

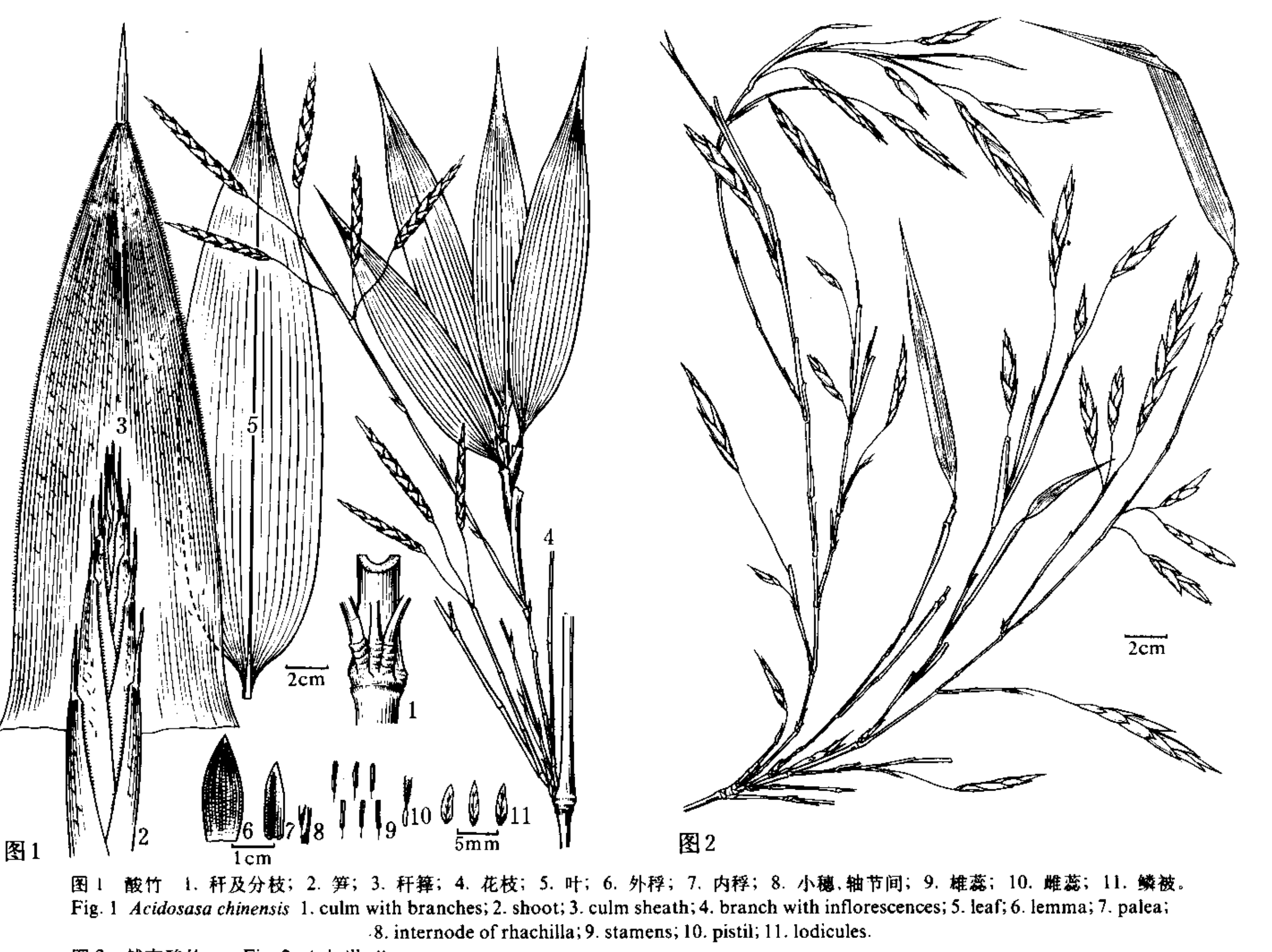


图1 酸竹 1. 秆及分枝; 2. 笋; 3. 秆箨; 4. 花枝; 5. 叶; 6. 外稃; 7. 内稃; 8. 小穗、轴节间; 9. 雄蕊; 10. 雌蕊; 11. 鳞被。

Fig. 1 *Acidosasa chinensis* 1. culm with branches; 2. shoot; 3. culm sheath; 4. branch with inflorescences; 5. leaf; 6. lemma; 7. palea; 8. internode of rhachilla; 9. stamens; 10. pistil; 11. lodicules.

图2 越南酸竹。 Fig. 2 *A. brilletii*.

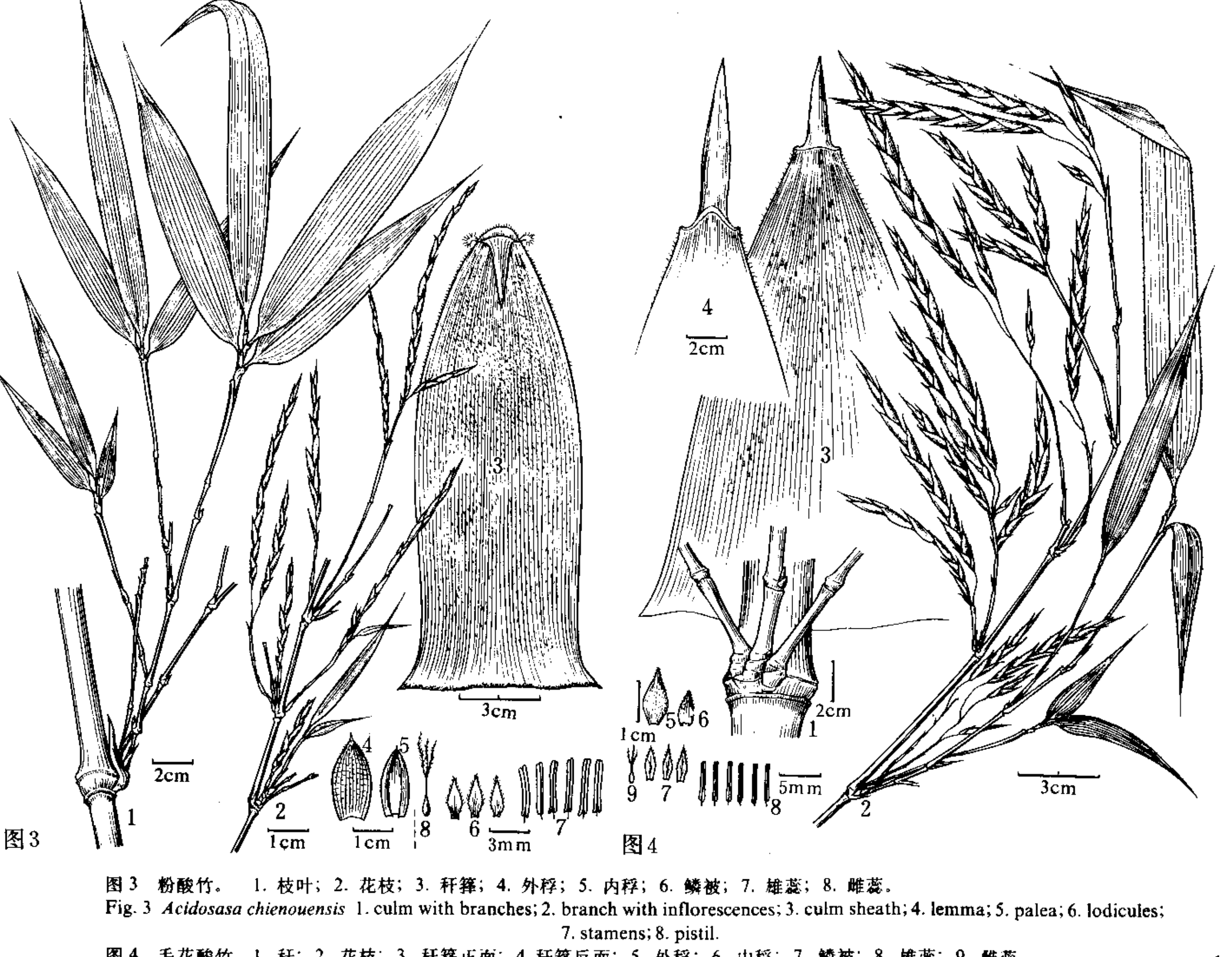


图3 粉酸竹。 1. 枝叶；2. 花枝；3. 秆箨；4. 外稃；5. 内稃；6. 鳞被；7. 雄蕊；8. 雌蕊。

Fig. 3 *Acidosasa chienouensis* 1. culm with branches; 2. branch with inflorescences; 3. culm sheath; 4. lemma; 5. palea; 6. lodicules; 7. stamens; 8. pistil.

图4 毛花酸竹 1. 秆；2. 花枝；3. 秆箨正面；4 秆箨反面；5. 外稃；6. 内稃；7. 鳞被；8. 雄蕊；9. 雌蕊。

Fig. 4 *A. hirtiflora* 1. part of culm; 2. branch with inflorescences; 3. outside of culm sheath; 4. inside of culm sheath; 5. lemma; 6. palea; 7. lodicules; 8. stamens; 9. pistil.

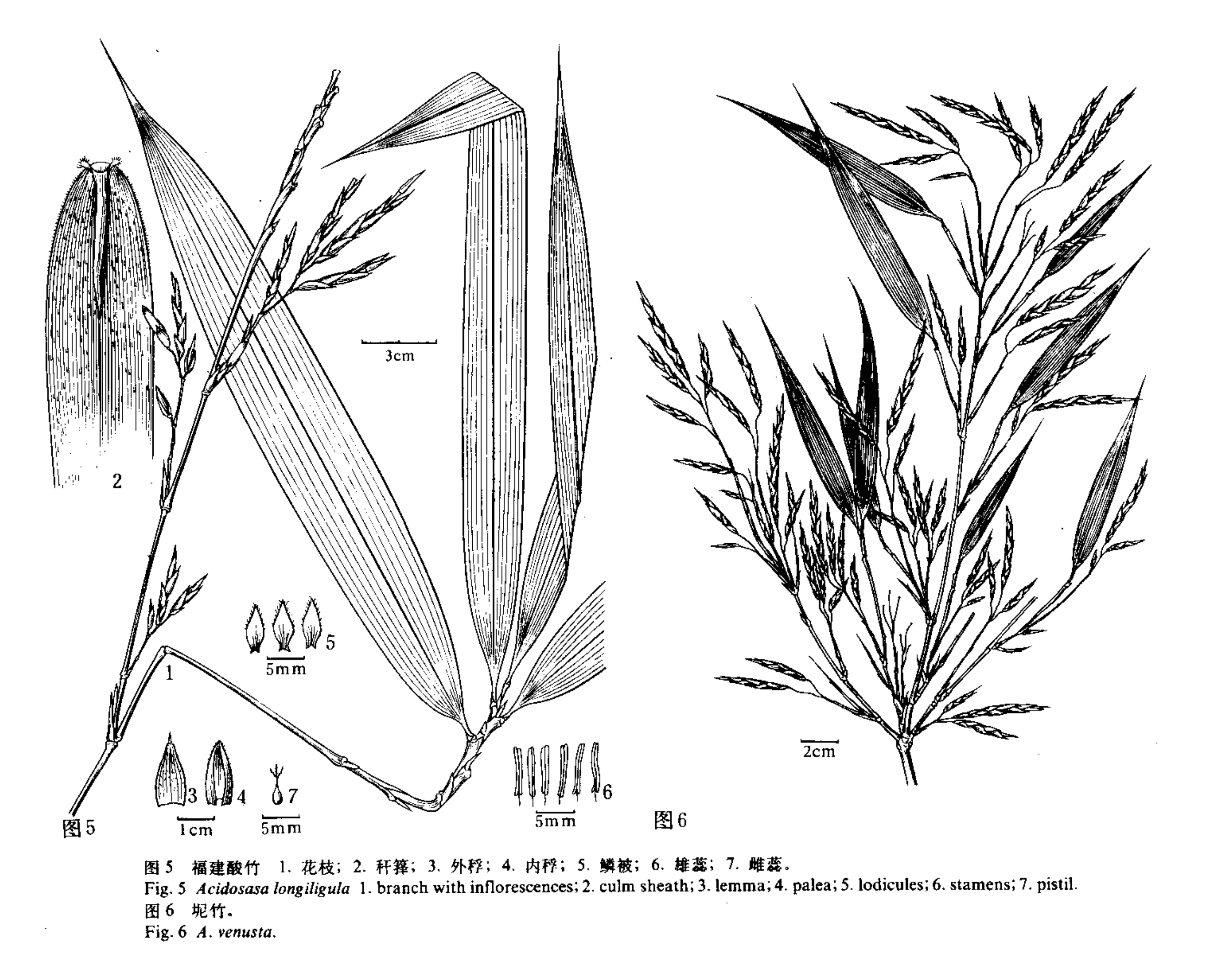


图5 福建酸竹 1. 花枝; 2. 秆箨; 3. 外稃; 4. 内稃; 5. 鳞被; 6. 雄蕊; 7. 雌蕊。
Fig. 5 *Acidosasa longiligula* 1. branch with inflorescences; 2. culm sheath; 3. lemma; 4. palea; 5. lodicules; 6. stamens; 7. pistil.
图6 坭竹。
Fig. 6 *A. venusta*.

B. M. Yang 的模式标本，发现两者为同一种，应予以归并。

4. **毛花酸竹** 图4

Acidosasa hirtiflora Z. P. Wang et G. H. Ye in Journ. Nanj. Univ. (Nat. Sci.) **1981** (1):98. f. 5. 1981. —— *Indosasa purpurea* Hsueh et Yi in Acta Phytotax. Sin. **21** (1):94. f. 1. 1983, syn. nov. —— *Acidosasa purpurea* (Hsueh et Yi) Keng f. in Journ. Wuhan Bot. Res. **4** (4):335. 1986, syn. nov. ——*Acidosasa dayongensis* Yi in Bull. Bot. Res. **6**(4):25. f. 1. 1986, syn. nov.**广西**：隆林，韦占业 00027 (holotype GSBI)。**云南**：马关，老君山，海拔 1100—1650 m，易同培 77333 (holotype of *Indosasa purpurea* FSSC). **湖南**：大庸，易同培 85404 (holotype of *Acidosasa dayongensis* FSSC)。

Indosasa purpurea Hsueh et Yi 的模式标本以及原发表的形态记载显然不应隶属于大节竹属。耿伯介先生注意到这一点，并组合到酸竹属中。但其花枝、小穗形态及被毛情况与毛花酸竹 *Acidosasa hirtiflora* 十分一致，唯前者模式采自发育较好的竹林，其竹秆、秆箨和枝叶发育较好；后一种的模式标本仅是一个花枝及发育不全的小笋，但两者在营养器官特征方面仍无多大区别，故予以归并。易同培先生采自湖南大庸县营养器官标本所发表的 *Acidosasa dayongensis* 与他本人已发表的 *Indosasa purpurea* 实为同种，两者模式标本的主要形态特征无明显区别。

5. **福建酸竹** 图5

Acidosasa longiligula (Wen) C. S. Chao et C. D. Chu comb. nov. —— *Indosasa longiligula* Wen in Journ. Bamb. Res. **2**(1): 68. f. 20. 1983 "longoligula" —— *Acidosasa fujianensis* C. S. Chao et H. Y. Zou in Journ. Nanj. Inst. For. **1984** (3):88. f. 1. 1984, syn. nov.

福建：安溪，感德，福建野生植物调查队无号 (holotype SHNM)南平，茂地—谢地，海拔 900 m，邹惠渝 0352 (holotype of *Acidosasa fujianensis* NFU)。

温太辉先生 1983 年根据上海自然历史博物馆所藏福建野生植物调查队的标本，发表为大节竹属的新种。次年，赵奇僧、邹惠渝又发表了福建酸竹，模式标本采自福建南平市，两者实为同种。

6. **泥竹** 图6

Acidosasa venusta (McCl.) Z. P. Wang et G. H. Ye in Journ. Nanj. Univ. (Nat. Sci.) **1981** (1): 99. 1981. —— *Semiarundinaria venusta* McCl. in Lingn. Univ. Sci. Bull. **9**:55. 1940. **广东**：中山大学竹园栽培，植株引自广东花县，冯钦 21002 (holotype U.S.A., isotype LU).

F. A. McClure 1940 年发表本种的讨论中指出"本种小花普遍出现 6 个雄蕊，背离了业平竹属目前的概念"，但当时没有其他具 6 个雄蕊的相似属种可供比较研究，因此他认为"似乎建立一个新属为期过早"。当酸竹属被建立后，王正平、叶光汉先生及时将本种从业平竹属组合到酸竹属。